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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/771,416	HONG ET AL.	
	Examiner	Art Unit	
	Katrina Fujita	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-24 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-24 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 February 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date See Continuation Sheet.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :02/05/2004, 12/20/2004, 02/04/2005.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "160" has been used to designate both the "segmentation parameter calculator" and the "parameter setter". When read in light of the specification, it appears that the reference numeral for the "segmentation parameter calculator" should be "60" rather than "160".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because it contains reference numerals from the drawings and exceeds 150 words in length. Correction is required. See MPEP § 608.01(b).

4. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code on page 3, line 12 and on page 37, line 24. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

5. The disclosure is objected to because of the following informalities:

On page 20, line 12, "surface modeler 70" should be --surface modeler ~~70~~ 80--.

On page 20, line 13, "texture generator 100" should be --texture generator ~~100~~ 90--.

On page 34, line 20, "steps S9-34 to S9-34" should be --steps ~~S9-34~~ S9-22 to S9-34--.

Appropriate correction is required.

Claim Objections

6. The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

7. Claims 1-3, 10, 14, 15 and 20-22 are objected to under 37 CFR 1.75(a), as failing to particularly point out and distinctly claim the subject matter which application regards as his invention or discovery.

Claim 1 lacks an antecedent basis for "the two-dimensional projection" recited in line 9. The following will be assumed for examination purposes: -- ~~the~~ a two-dimensional projection--.

Claim 2 recites "from an image" in line 2. It is unclear whether this is intended to be the same as or different from the "at least one image" recited in line 11 of claim 1. The following will be assumed for examination purposes: --from ~~an~~ the at least one image--.

Claim 2 recites "selecting pixels" in line 4. It is unclear whether this is intended to be the same as or different from the "pixels" recited in line 1. The following will be assumed for examination purposes: --selecting the pixels--.

Claim 3 recites "pixels" in line 1. It is unclear whether this intended to be the same as or different from the "pixels" recited in line 1 of claim 2. The following will be assumed for examination purposes: --the pixels--.

Claim 3 recites "from an image" in line 2. It is unclear whether this is intended to be the same as or different from the "at least one image" recited in line 11 of claim 1.

The following will be assumed for examination purposes: --from ~~an~~ the at least one image--.

Claim 3 recites "selecting pixels" in line 2. It is unclear whether this is intended to be the same as or different from the "pixels" recited in line 11 of claim 1. The following will be assumed for examination purposes: --selecting the pixels--.

Claim 10 lacks an antecedent basis for "the two-dimensional projection" recited in line 9. The following will be assumed for examination purposes: -- ~~the~~ a two-dimensional projection--.

Claim 14 recites "from an image" in line 2. It is unclear whether this is intended to be the same as or different from the "at least one image" recited in line 12 of claim 13. The following will be assumed for examination purposes: --from ~~an~~ the at least one image--.

Claim 14 recites "select pixels" in line 2. It is unclear whether this is intended to be the same as or different from the "pixels" recited in line 12 in claim 13. The following will be assumed for examination purposes: --select the pixels--.

Claim 14 recites "selecting pixels" in line 4. It is unclear whether this is intended to be the same as or different from the "pixels" recited in line 12 of claim 13. The following will be assumed for examination purposes: --selecting the pixels--.

Claim 15 recites "select pixels" in line 2. It is unclear whether this is intended to be the same as or different from the "pixels" recited in line 12 in claim 13. The following will be assumed for examination purposes: --select the pixels--.

Claim 15 recites "from an image" in line 2. It is unclear whether this is intended to be the same as or different from the "at least one image" recited in line 12 of claim 13. The following will be assumed for examination purposes: --from ~~an~~ the at least one image--.

Claim 15 recites "selecting pixels" in line 3. It is unclear whether this is intended to be the same as or different from the "pixels" recited in line 12 of claim 13. The following will be assumed for examination purposes: --selecting the pixels--.

Claim 20 lacks an antecedent basis for "the two-dimensional projection" recited in line 9. The following will be assumed for examination purposes: -- ~~the~~ a two-dimensional projection--.

Claim 21 lacks an antecedent basis for "the two-dimensional projection" recited in line 9. The following will be assumed for examination purposes: -- ~~the~~ a two-dimensional projection--.

Claim 22 lacks an antecedent basis for "the two-dimensional projection" recited in line 9. The following will be assumed for examination purposes: -- ~~the~~ a two-dimensional projection--.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in Sec. 101.

... a signal does not fall within one of the four statutory classes of Sec. 101.

... signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of Sec. 101.

9. Claim 24 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 24 defines a signal with descriptive material. While "functional descriptive material" may be claimed as a statutory product (i.e., a "manufacture") when embodied on a tangible computer readable medium, a signal embodying that same functional descriptive material is neither a process (i.e., a series of steps per se.) nor a product (i.e., a tangible "thing") and therefore does not fall within one of the four statutory classes of § 101. Rather, a "signal" is a form of energy, in the absence of any physical structure or tangible material.

Claim Rejections - 35 USC § 102

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1, 2, 4-7, 10, 13, 14, 16-22, 23/1,2, 4-7,10 and 24/1, 2, 4-7, 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujiwara (US 2002/0150288).

Regarding **claims 1, 10, 13, and 20**, Fujiwara discloses a method and apparatus for processing data defining a plurality of images of an object recorded at different positions and orientations ("method and device for processing an image in which a portion corresponding to a subject is extracted from plural shot image" at paragraph 0003, line 1) and data defining the positions and orientations to generate data defining a three-dimensional computer model of the object ("reconstructs the shape in accordance with the extracted object areas" at paragraph 0023, line 20; "acquires shoot condition data D1 that indicate the positional relationship between the digital camera 10 and the object 90" at paragraph 0023, line 21) comprising:

a volume definer (figure 8, numeral 601) operable to define a volume in three-dimensional space ("the three-dimensional shape data are initialized" at paragraph 0036, line 1) enclosing the object ("the area where the voxels are arranged is set sufficiently larger than the area of the virtual space in which the object 90 is expected to exist" at paragraph 0036, line 4);

a volume projector (figure 6, numeral 204) operable to determine a two-dimensional projection of the volume ("visual volume is projected" at paragraph 0047, line 1) in at least one of the images ("lines of sight passing through the boundary are projected onto the image" at paragraph 0047, line 3);

a pixel selector (figure 6, numeral 210) operable to select pixels ("pixel value corresponding to the binary image H_i is "1" and the pixel value corresponding to the image I_i satisfies the following condition is determined" at paragraph 0055, line 2) from at least one image in dependence upon the volume projection therein ("line of sight projected onto image I_i" at paragraph 0047, line 7);

a segmentation parameter definer (figure 6, numeral 210) operable to determine segmentation parameters ("$||c_k - c_b|| > t_b$ or $||c_k c_r|| > t_r$" at paragraph 0055, line 8) in dependence upon at least one image property of the selected pixels ("c_k denotes the color vector of the pixel P_k" at paragraph 0056, line 4), the segmentation parameters comprising parameters for distinguishing between subject object image data and other image data during segmentation processing ("pixel having the binary image value of "1" is a pixel that was estimated to belong to the object area" at paragraph 0057, line 3);

an image data segmenter (figure 6, numeral 210) operable to process the image data to segment image data relating to the object from other image data ("pixel having the binary image value of "1" is a pixel that was estimated to belong to the object area" at paragraph 0057, line 3) in at least some of the images ("image I_i" at paragraph 0055, line 4) using the generated segmentation parameters ("satisfies the following condition

is determined" at paragraph 0055, line 4; "$||c_k - c_b|| > t_b$ or $||c_k c_r|| > t_r$" at paragraph 0055, line 8); and

a three-dimensional computer model data generator (figure 3, numeral 120) operable to generate data defining a three-dimensional computer model of the object ("the three-dimensional shape data are displayed" at paragraph 0042, line 1) using the results of the segmentation processing and the data defining the positions and orientations at which the images were recorded ("estimates the three-dimensional shape of the object 90 in accordance with the object areas extracted from plural images" at paragraph 0023, line 29).

Regarding **claims 2 and 14**, Fujiwara discloses a method and apparatus wherein the pixels are selected ("pixel value corresponding to the binary image H_i is "1" and the pixel value corresponding to the image I_i satisfies the following condition is determined" at paragraph 0055, line 2) from the at least one image by determining the position of the outer perimeter ("enclosed by the lines of sight passing the object area 710 in the processed image 71[j-th (j-1,2,...,i-1) image I_j] and the boundary thereof" at paragraph 0040, line 4) of the volume projection in the image ("line of sight projected onto image I_i" at paragraph 0047, line 7) and selecting the pixels in dependence upon the determined outer perimeter position ("area becomes an intersection area v of the projection image areas" at paragraph 0049, line 5; figure 4B, numeral 757).

Regarding **claims 4 and 16**, Fujiwara discloses a method and apparatus wherein the apparatus is operable to repeat the processing operations at least once ("it is decided whether the subsequent process is repeated or not" at paragraph 0043, line 1),

and wherein, on the second and each subsequent time the operations are performed ("process goes back to Step #110 for taking a picture of another position of posture different from the previous one" at paragraph 0043, line 8), the volume definer (figure 8, numeral 601) is arranged to define the volume to be the three-dimensional computer model of the object generated a previous time the operations were performed ("if the user decided that the shape is not sufficiently reproduced, he or she instructs the computer 60 to continue the process" at paragraph 0043, line 6; the subsequent processing is based on the constructed volume rather than an initialized volume as defined in figure 3, numeral 108).

Regarding **claims 5 and 17**, Fujiwara discloses a method and apparatus wherein the image data segmenter (figure 6, numeral 210) is operable to perform segmentation processing using the generated segmentation parameters ("satisfies the following condition is determined" at paragraph 0055, line 4; "$||c_k - c_b|| > t_b$ or $||c_k c_r|| > t_r$" at paragraph 0055, line 8) only on image data within the projection of the volume in the image ("pixel value corresponding to image I_i" at paragraph 0055, line 3; "lines of sight passing through the boundary are projected onto the image Ii" at paragraph 0047, line 3), and to classify the image data outside the projection of the volume as image data which does not relate to the object ("pixel value corresponding to the determined pixel area of "1" and the other pixel value of "0" is generated" at paragraph 0055, line 5).

Regarding **claims 6 and 18**, Fujiwara discloses a method and apparatus wherein the segmentation parameter definer (figure 6, numeral 210) is operable to determine the segmentation parameters ("$||c_k - c_b|| > t_b$ or $||c_k c_r|| > t_r$" at paragraph 0055, line 8) in

dependence upon the value of at least one colour component of each selected pixel ("reference character c_k denotes the color vector of the pixel P_k" at paragraph 0056, line 4).

Regarding **claims 7 and 19**, Fujiwara discloses a method and apparatus wherein:

each image to be processed (figure 2, numeral 70) shows the object together with a calibration object (figure 1, numeral 40; "camera calibration tool 40" at paragraph 0029, line 4) and the data defining the positions and orientations of the images ("acquires shoot condition data D1 that indicate the positional relationship between the digital camera 10 and the object 90" at paragraph 0023, line 21) defines the positions and orientations of the images and the position of the calibration object in the same three-dimensional coordinate system ("display area 621 displays an image 70 inputted from the digital camera" at paragraph 0025, line 3; "gives a geometric relationship between the world coordinates and the pixel coordinate of the image" at paragraph 0029, line 8); and

the volume definer (figure 3, numeral 108) is operable to define the volume enclosing the object ("the area where the voxels are arranged is set sufficiently larger than the area of the virtual space in which the object 90 is expected to exist" at paragraph 0036, line 4) in the three-dimensional coordinate system of the images and calibration object ("the three-dimensional shape data are initialized" at paragraph 0036, line 1) in dependence upon the calibration object ("cursor on one of the grid points of the camera calibration tool 40...after repeating this operation for plural grid points, the

user instructs the computer 60 to calculate a projection matrix Po" at paragraph 0029, line 3).

Regarding **claim 21**, Fujiwara discloses an apparatus for processing data defining a plurality of images of an object recorded at different positions and orientations and data defining the positions and orientations to generate data defining a three-dimensional computer model of the object, the apparatus comprising:

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for constructing a volume around the object) defining a volume in three-dimensional space ("the three-dimensional shape data are initialized" at paragraph 0036, line 1) enclosing the object ("the area where the voxels are arranged is set sufficiently larger than the area of the virtual space in which the object 90 is expected to exist" at paragraph 0036, line 4);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for projecting the volume into an image) determining the two-dimensional projection of the volume ("visual volume is projected" at paragraph 0047, line 1) in at least one of the images ("lines of sight passing through the boundary are projected onto the image" at paragraph 0047, line 3);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for choosing pixels from the image) selecting pixels ("Among the pixels p_k ($k=1,2,...N_j$) of the image I_i, a pixel area that satisfies either of the two following conditions is determined" at paragraph 0049, line 2) from at least one image in

dependence upon the volume projection therein ("line of sight projected onto image I_i" at paragraph 0047, line 7);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for creating segmentation parameters for segmentation) determining segmentation parameters ("$||c_k- c_b||>t_b$ or $||c_kc_r||>t_r$" at paragraph 0055, line 8) in dependence upon at least one image property of the selected pixels ("c_k denotes the color vector of the pixel P_k" at paragraph 0056, line 4), the segmentation parameters comprising parameters for distinguishing between subject object image data and other image data during segmentation processing ("pixel having the binary image value of "1" is a pixel that was estimated to belong to the object area" at paragraph 0057, line 3);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for segmenting the image) processing the image data to segment image data relating to the object from other image data ("pixel having the binary image value of "1" is a pixel that was estimated to belong to the object area" at paragraph 0057, line 3) in at least some of the images ("image I_i" at paragraph 0055, line 4) using the generated segmentation parameters ("satisfies the following condition is determined" at paragraph 0055, line 4; "$||c_k- c_b||>t_b$ or $||c_kc_r||>t_r$" at paragraph 0055, line 8); and

means for figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for constructing the 3D image model) generating data defining a three-dimensional computer model of the object ("the three-dimensional shape data are displayed" at paragraph 0042, line 1) using the results of the segmentation processing and the data defining the positions and orientations at which the images were recorded

("estimates the three-dimensional shape of the object 90 in accordance with the object areas extracted from plural images" at paragraph 0023, line 29).

Regarding **claim 22**, Fujiwara discloses an apparatus for processing data defining a plurality of images of an object recorded at different positions and orientations and data defining the positions and orientations to segment image data relating to the object from other image data in the images, the apparatus comprising:

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for constructing a volume around the object) defining a volume in three-dimensional space ("the three-dimensional shape data are initialized" at paragraph 0036, line 1) enclosing the object ("the area where the voxels are arranged is set sufficiently larger than the area of the virtual space in which the object 90 is expected to exist" at paragraph 0036, line 4);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for projecting the volume into an image) determining the two-dimensional projection of the volume ("visual volume is projected" at paragraph 0047, line 1) in at least one of the images ("lines of sight passing through the boundary are projected onto the image" at paragraph 0047, line 3);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for choosing pixels from the image) selecting pixels ("Among the pixels p_k ($k=1,2,\ldots N_j$) of the image I_i, a pixel area that satisfies either of the two following conditions is determined" at paragraph 0049, line 2) from at least one image in

dependence upon the volume projection therein ("line of sight projected onto image I_i" at paragraph 0047, line 7);

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for creating segmentation parameters for segmentation) determining segmentation parameters ("$||c_k- c_b||>t_b$ or $||c_kc_r||>t_r$" at paragraph 0055, line 8) in dependence upon at least one image property of the selected pixels ("c_k denotes the color vector of the pixel P_k" at paragraph 0056, line 4), the segmentation parameters comprising parameters for distinguishing between subject object image data and other image data during segmentation processing ("pixel having the binary image value of "1" is a pixel that was estimated to belong to the object area" at paragraph 0057, line 3); and

means for (figure 1, numeral 60, which is equivalent to applicant's disclosed apparatus for segmenting the image) processing the image data to segment image data relating to the object from other image data ("pixel having the binary image value of "1" is a pixel that was estimated to belong to the object area" at paragraph 0057, line 3) in at least some of the images ("image I_i" at paragraph 0055, line 4) using the generated segmentation parameters ("satisfies the following condition is determined" at paragraph 0055, line 4; "$||c_k- c_b||>t_b$ or $||c_kc_r||>t_r$" at paragraph 0055, line 8).

Regarding **claims 23/1, 23/2, 23/4-7 and 23/10**, Fujiwara discloses a storage medium storing computer program instructions (figure 1, numerals 67 and 68) to program a programmable processing apparatus to become operable to perform the method as described in claims 1, 2, 4-7 and 10 ("A program recorded in a CD-ROM 67

or another medium 68 is installed into the computer 60. The program makes the computer 60 work as an image data processor and modeling device" at paragraph 0023, line 12).

Regarding **claims 24/1, 24/2, 24/4-7 and 24/10**, Fujiwara discloses a signal carrying computer program instructions (electrical signal that results from reading contents of figure 1, numerals 67 and 68) to program a programmable processing apparatus to become operable to perform the methods as described in claims 1, 2, 4-7 and 10 ("A program recorded in a CD-ROM 67 or another medium 68 is installed into the computer 60. The program makes the computer 60 work as an image data processor and modeling device" at paragraph 0023, line 12).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 3, 15, 23/3 and 24/3 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Fujiwara and Kutulakos et al. ("A Theory of Shape...", Computer Science Technical Report).

Regarding **claims 3 and 15**, Fujiwara discloses a method and apparatus wherein the pixels are selected ("pixel value corresponding to the image I_i satisfies the following condition is determined" at paragraph 0055, line 3) from the at least one image by determining the position of the outer perimeter ("enclosed by the lines of sight passing the object area 710 in the processed image 71[j-th (j-1,2,...,i-1) image I_j] and the boundary thereof" at paragraph 0040, line 4) of the volume projection in the image ("line of sight projected onto image I_i" at paragraph 0047, line 7).

Fujiwara does not disclose selecting the pixels from a band adjacent the outer perimeter of the volume projection.

Kutulakos et al. discloses a method ("simple, discrete algorithm that "carves" space" at section 4, paragraph 1, line 1) and apparatus ("compute V* on a SGI O2 R10000/175MHz workstation" at section 5, paragraph 4, line 11) for reconstructing a 3D object using multiple images ("3D scene from multiple photographs" at section 1, paragraph 1, line 1) wherein pixels are selected ("selecting the voxel" at section 4, paragraph 4, line 1) from at least one image ("all photographs in $Vis_V(v)$" at section 4, paragraph 4, line 12) by selecting the pixels from a band (the surface of V consists of a voxel wide band) adjacent the outer perimeter of the volume projection ("voxel v is found on the surface of V" at section 4, paragraph 4, line 11; the surface of V is adjacent the outer perimeter of the projection).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the pixel selection of Fujiwara using the voxel examination taught by Kutulakos et al. as described above, such that the "volume is guaranteed to

converge to the maximal photo-consistent shape" (Kutulakos et al. at section 4, paragraph 4, line 4).

Regarding **claim 23/3**, Fujiwara discloses a storage medium storing computer program instructions (figure 1, numerals 67 and 68) to program a programmable processing apparatus to become operable to perform the method as described in claim 3 ("A program recorded in a CD-ROM 67 or another medium 68 is installed into the computer 60. The program makes the computer 60 work as an image data processor and modeling device" at paragraph 0023, line 12).

Regarding **claim 24/3**, Fujiwara discloses a signal carrying computer program instructions (electrical signal that results from reading contents of figure 1, numerals 67 and 68) to program a programmable processing apparatus to become operable to perform the methods as described in claim 3 ("A program recorded in a CD-ROM 67 or another medium 68 is installed into the computer 60. The program makes the computer 60 work as an image data processor and modeling device" at paragraph 0023, line 12).

13. Claims 8, 9, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Fujiwara and Chang et al. (US 7,046,840).

Regarding **claim 8**, Fujiwara discloses the elements of claim 1 as described in the 102 rejection above.

Fujiwara does not disclose a method further comprising generating a signal carrying data defining the generated three-dimensional computer model.

Chang et al. discloses a method of processing data ("method for constructing a three-dimensional model" at col. 2, line 65) defining a plurality of images of an object recorded at different positions and orientations ("Photographs from several perspectives are taken of the object" at col. 3, line 13) and data defining the positions and orientations ("locations of the features in the images" at col. 3, line 4) to generate data defining a three-dimensional computer model of the object ("determine a three-dimensional model of the object" at col. 3, line 7), the method comprising generating a signal ("exported for use in other software" at col. 13, line 48; when exporting the data, an electrical signal is produced within the computer) carrying data defining the generated three-dimensional computer model ("reconstructed 3D model" at col. 13, line 48).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the computer body of Fujiwara using the signal generator taught by Kochi et al. as described above, to increase versatility of the model data by enabling it to be utilized by other software programs.

Regarding **claim 11**, Fujiwara discloses the elements of claim 10 as described in the 102 rejection above.

Fujiwara does not disclose a method further comprising generating a signal carrying data defining the silhouette of the subject object in each of the at least some images.

Chang et al. discloses a method of processing data ("method for constructing a three-dimensional model" at col. 2, line 65) defining a plurality of images of an object

recorded at different positions and orientations ("Photographs from several perspectives are taken of the object" at col. 3, line 13) and data defining the positions and orientations ("locations of the features in the images" at col. 3, line 4) to generate data defining a three-dimensional computer model of the object ("determine a three-dimensional model of the object" at col. 3, line 7), the method comprising generating a signal ("exported for use in other software" at col. 13, line 48; when exporting the data, an electrical signal is produced within the computer) carrying data defining the silhouette of the subject object in each of the at least some images ("reconstructed 3D model" at col. 13, line 48; the 3D model shows the outline, or silhouette, of the object).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the computer body of Fujiwara using the signal generator taught by Kochi et al. as described above, to increase versatility of the model data by enabling it to be utilized by other software programs.

Regarding **claims 9 and 12**, Fujiwara discloses the elements of claims 1 and 10 as described in the 102 rejections above.

Fujiwara does not disclose a method further comprising making a recording of the signal either directly or indirectly.

Chang et al. discloses a method of processing data ("method for constructing a three-dimensional model" at col. 2, line 65) defining a plurality of images of an object recorded at different positions and orientations ("Photographs from several perspectives are taken of the object" at col. 3, line 13) and data defining the positions and orientations ("locations of the features in the images" at col. 3, line 4) to generate data

defining a three-dimensional computer model of the object ("determine a three-dimensional model of the object" at col. 3, line 7), the method comprising making a recording ("format conversion process can modify the complexity of the 3D model...to meet the quality or rendering speed requirements of a particular user or software package" at col. 13, line 52; the data is copied over after export) of the signal ("exported for use in other software" at col. 13, line 48; when exporting the data, an electrical signal is produced within the computer) either directly or indirectly.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the computer body of Fujiwara using the signal recording taught by Kochi et al. as described above, to increase versatility of the model data by enabling it to be utilized by other software programs.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6,563,499 and US 6,455,835 are each pertinent as teaching computer based 3D reconstruction systems and methods.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katrina Fujita whose telephone number is (571) 270-1574. The examiner can normally be reached on M-Th 8-5:30pm, F 8-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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